TEST REPORT

Reference No.	:	WTX24X12296736W002
Manufacturer	:	Lumi United Technology Co., Ltd.
Address	:	Room 801-804, Building 1, Chongwen Park, Nanshan iPark, No. 3370, Liuxian Avenue, Fuguang Community, Taoyuan Residential District, Nanshan District, Shenzhen, China
Product Name	:	Chime Repeater
Model No.	:	CH-C11E
Standards	:	**ETSI EN 300 440 V2.2.1 (2018-07)**
Date of Receipt sample	:	2024-12-16
Date of Test	:	2024-12-16 to 2025-02-19
Date of Issue	:	2025-02-19
Test Report Form No.	:	WTX_ETSI EN 300 440_2018W
Test Result	:	**Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of approver.

Prepared By:

Waltek Testing Group (Shenzhen) Co., Ltd.

Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Block 70 Bao'an District, Shenzhen, Guangdong, China

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Tested by:

Dashan Chen/ Project Engineer

Approved by:

Jason Su/ Manager

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Rev.00	2025-02-19	Original
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1 GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

General Description of EUT	
Product Name:	Chime Repeater
Trade Name:	Aqara
Model No.:	CH-C11E
Adding Model(s):	CH-C11D
Rated Voltage:	DC5V
Battery Capacity:	/
Power Adapter:	/
Software Version:	/
Hardware Version:	/
Support Standards:	802.11a, 802.11n(HT20/40); 802.11ac-VTH20/40/80
RF Output Power	Max. 13.65dBm (EIRP)
Frequency Range:	5745-5825MHz
Modulation:	BPSK, QPSK,16QAM,64QAM,256QAM
Antenna Type:	FPC Antenna
Antenna Gain:	0.5dBi
Note: The Antenna Gain is provided by the customer and can affect the validity of results. *The test data is gathered from a production sample provided by the manufacturer. The appearance of others models listed in the report is different from main-test model CH-C11E, but the circuit and the electronic construction do not change, declared by the manufacturer.*	

1.2 Test Standards

The tests were performed according to following standards:

ETSI EN 300 440 V2.2.1 (2018-07): Short Range Devices (SRD);Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Harmonised Standard for access to radio spectrum.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the immunity should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ETSI EN 300 440, the equipment under test (EUT) was configured to measure its highest possible emission level. For more detail refer to the Operating Instructions.
For radiation emission tests above 1GHz, it is referred to section EN 300 440 Annex A, E, F using the substitution measurement.

1.4 Test Facility

Address of the test laboratory
Laboratory: Waltek Testing Group (Shenzhen) Co., Ltd.
Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Block 70 Bao'an District, Shenzhen, Guangdong, China

FCC – Registration No.: 125990
Waltek Testing Group (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A
The 3m Semi-anechoic chamber of Waltek Testing Group (Shenzhen) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

1.5 EUT Setup and Test Mode

The equipment under test (EUT) was configured to measure its highest possible emission/immunity level. The test modes were adapted according to the operation manual for use, the EUT was operated in the engineering mode to fix the Tx/Rx frequency that was for the purpose of the measurements, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	802.11a	5745MHz, 5785MHz, 5805MHz
TM2	802.11n-HT20/802.11ac-VHT20	5745MHz, 5785MHz, 5805MHz
TM3	802.11n-HT40/802.11ac-VHT40	5755MHz, 5795MHz
TM4	802.11ac-VHT80	5775MHz
TM5	Receiving	/

Test Conditions					
	Normal	LTLV	LTHV	HTHV	HTLV
Temperature (°C)	25	-10	-10	+50	+50
Voltage (V)	5	4.5	5.5	4.5	5.5
Relative Humidity:	55%.				
ATM Pressure:	1019 mbar				

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
USB Cable	1.0	Shielded	Without Ferrite

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Doorbell Camera Hub	Lumi	CH-C09E	/
Adapter	Xiaomi	MDY-08-EH	/

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Uncertainty	Notes
Conducted EIRP	±0.42dB	(1)
Frequency Range	$\pm 1\times10^{-7}$	(1)
Radiated Spurious Emissions	30-200MHz ±4.52dB	(1)
	0.2-1GHz ±5.56dB	(1)
	1-6GHz ±3.84dB	(1)
	6-18GHz ±3.92dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

1.7 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Spectrum Analyzer	Agilent	N9020A	US47140102	2024-03-19	2025-03-18
Signal Generator	Agilent	83752A	3610A01453	2024-02-24	2025-02-23
Vector Signal Generator	Agilent	N5182A	MY47070202	2024-02-24	2025-02-23
Power Sensor	Agilent	U2021XA	MY55160007	2024-02-24	2025-02-23
Power Sensor	Agilent	U2021XA	MY54240001	2024-02-24	2025-02-23
Simultaneous Sampling	Agilent	U2531A	TW54243509	2024-02-24	2025-02-23
Temperature&Humidity Chamber	/	HTC-1	/	2024-02-24	2025-02-23
Universal Radio Communication Tester	Rohde & Schwarz	CMW500	148650	2024-02-24	2025-02-23
Attenuator	Pasternack	PE4007-4	/	2024-02-24	2025-02-23
Coaxial Cable	/	0M4RFC	/	2024-07-03	2025-01-03
				2025-01-03	2025-07-02
☐Chamber A: Below 1GHz					
Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2024-02-24	2025-02-23
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2024-03-19	2025-03-18
Amplifier	HP	8447F	2805A03475	2024-02-24	2025-02-23
Loop Antenna	Schwarz beck	FMZB 1516	9773	2024-02-26	2025-02-25
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2024-02-24	2025-02-23
Coaxial Cable	/	RC_6G-N-M	/	2024-03-15	2025-03-14
Coaxial Cable	/	RC_6G-N-M	/	2024-03-15	2025-03-14
Coaxial Cable	/	RC_6G-N-M	/	2024-03-15	2025-03-14
☐Chamber A: Above 1GHz					
Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2024-02-24	2025-02-23
Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2024-02-27	2025-02-26
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2024-03-19	2025-03-18
Amplifier	C&D	PAP-1G18	2002	2024-02-27	2025-02-26
Horn Antenna	ETS	3117	00086197	2024-02-26	2025-02-25
DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2024-03-17	2025-03-16
Pre-amplifier	Schwarzbeck	BBV 9721	9721-031	2024-02-29	2025-02-28
Coaxial Cable	/	C16-07-07	/	2024-03-15	2025-03-14
Coaxial Cable	/	C16-07-07	/	2024-03-15	2025-03-14
Coaxial Cable	/	C16-07-07	/	2024-03-15	2025-03-14
☐Chamber B:Below 1GHz					
Trilog Broadband	Schwarz beck	VULB9163(B)	9163-635	2024-03-17	2027-03-16

Antenna					
Amplifier	Agilent	8447D	2944A10457	2024-02-24	2025-02-23
EMI Test Receiver	Rohde & Schwarz	ESPI	101391	2024-02-24	2025-02-23
Coaxial Cable	/	1.5MRFC-LWB3	/	2024-07-03	2025-07-02
Coaxial Cable	/	RG 316	/	2024-07-03	2025-07-02
Coaxial Cable	/	RG 316	/	2024-07-03	2025-07-02
☒Chamber C:Below 1GHz					
EMI Test Receiver	Rohde & Schwarz	ESIB 26	100401	2024-02-27	2025-02-26
Trilog Broadband Antenna	Schwarz beck	VULB 9168	1194	2024-04-18	2027-04-17
Loop Antenna	Schwarz beck	FMZB 1516	9773	2024-02-26	2025-02-25
Amplifier	HP	8447F	2944A03869	2024-02-24	2025-02-23
Coaxial Cable	/	RC_6G-N-M	/	2024-07-03	2025-07-02
Coaxial Cable	/	RC_6G-N-M	/	2024-07-03	2025-07-02
Coaxial Cable	/	RC_6G-N-M	/	2024-07-03	2025-07-02
☒Chamber C: Above 1GHz					
EMI Test Receiver	Rohde & Schwarz	ESIB 26	100401	2024-02-27	2025-02-26
Horn Antenna	POAM	RTF-118A	1820	2023-03-10	2026-03-09
Amplifier	Tonscend	TAP01018050	AP22E806235	2024-02-27	2025-02-26
DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2024-03-17	2025-03-16
Pre-amplifier	Schwarzbeck	BBV 9721	9721-031	2024-02-29	2025-02-28
Coaxial Cable	/	RC-18G-N-M	/	2024-07-03	2025-07-02
Coaxial Cable	/	RC-18G-N-M	/	2024-07-03	2025-07-02
Coaxial Cable	/	RC-18G-N-M	/	2024-07-03	2025-07-02

Software List			
Description	Manufacturer	Model	Version
EMI Test Software (Radiated Emission A)	Farad	EZ-EMC	RA-03A1 (1.1.4.2)
EMI Test Software (Radiated Emission B)	Farad	EZ-EMC	RA-03A1 (1.1.4.2)
EMI Test Software (Radiated Emission C)	Farad	EZ-EMC	RA-03A1-2 (1.1.4.2)

*Remark: indicates software version used in the compliance certification testing.

2. SUMMARY OF TEST RESULTS

Standards	Reference	Description of Test Item	Result
ETSI EN 300 440	4.2.2	e.i.r.p.	Pass
	4.2.3	Permitted Range of Operating Frequencies	Pass
	4.2.4	Unwanted emissions in the spurious domain	Pass
	4.2.5.4	Duty Cycle	N/A
	4.2.6	Additional requirements for FHSS equipment	N/A
	4.3.3	Adjacent channel selectivity	Pass
	4.3.4	Blocking or desensitization	Pass
	4.3.5	Spurious radiation	Pass
	4.4	Spectrum access techniques	Pass
	4.6.4	GBSAR antenna pattern	N/A
	Annex I	Limits for GBSAR	N/A

Pass: The EUT complies with the essential requirements in the standard.
Fail: The EUT does not comply with the essential requirements in the standard.
N/A: not applicable.

3. e.i.r.p.

3.1 Standard Applicable

According to ETSI EN 300 440 section 4.2.2, the effective radiated power shall not exceed the power class value given in following table:
Table 2: Maximum radiated peak power (e.i.r.p.)

Frequency Bands	Power	Application	Notes
2400MHz to 2 483.5MHz	10mW e.i.r.p.	Non-specific short range devices	
2400MHz to 2 483.5MHz	25mW e.i.r.p.	Radio determination devices	
(a) 2446MHz to 2454MHz	500mW e.i.r.p.	Radio Frequency Identification (RFID) devices	See also table 4 and annex G
(b) 2446MHz to 2454MHz	4W e.i.r.p.	Radio Frequency Identification (RFID) devices	See also table 4 and annex G
5725MHz to 5875MHz	25mW e.i.r.p.	Non-specific short range devices	
9200MHz to 9500MHz	25mW e.i.r.p.	Radio determination devices	
9500MHz to 9975MHz	25mW e.i.r.p.	Radio determination devices	
10.5GHz to 10.6GHz	500mW e.i.r.p.	Radio determination devices	
13.4GHz to 14.0GHz	25mW e.i.r.p.	Radio determination devices	
17.1GHz to 17.3GHz	400mW e.i.r.p.	Radio determination devices	See annex H
24.00GHz to 24.25GHz	100mW e.i.r.p.	Non-specific short range devices and Radio determination devices	

3.2 Test Procedure

According to section 4.2.2 of the standard EN 300440, the test procedure shall be as follows:

1. Using a suitable means, the output of the transmitter shall be connected to the spectrum analyzer, the spectrum analyzer shall be capable of faithfully reproducing the envelope peaks and the duty cycle of the transmitter output signal. The observed duty cycle of the transmitter (Tx on/(Tx on + Tx off)) shall be noted as x, (0 < x < 1) and recorded.

2. The average output power of the transmitter shall be determined using the spectrum analyzer. The observed value shall be recorded as "A" (in dBm).

3. The e.i.r.p. shall be calculated from the above measured power output A, the observed duty cycle x, and the applicable antenna assembly gain "G" in dBi, according to the formula:
- P = A + G + 10 log (1/x);

4. The measurement shall be repeated at the lowest, the middle, and the highest frequency of the stated frequency range. These frequencies shall be recorded. FHSS equipment shall be made to hop continuously to each of these three frequencies separately. These measurements shall be performed at normal and

extreme test conditions.

3.3 Summary of Test Results

Please refer to Appendix B

4. Permitted Range of Operating Frequencies

4.1 Applicable Standard

According to EN 300 440 section 4.2.3

The frequency range of the equipment is determined by the lowest and highest frequencies occupied by the power envelope in accordance with CEPT/ERC Recommendation 74-01 [2].
fH is the highest frequency of the power envelope, it is the frequency furthest above the frequency of maximum power where the output power drops below the level of –75dBm/Hz spectral power density (-30 dBm if measured in a 30 kHz reference bandwidth) eirp.
fL is the lowest frequency of the power envelope; it is the frequency furthest below the frequency of maximum power where the output power drops below the level of –75dBm/Hz spectral power density (-30 dBm if measured in a 30 kHz reference bandwidth) eirp.

4.2 Test Procedure

According to section 4.2.3 of the standard EN 300440, the test procedure shall be as follows:

1. Put the spectrum analyzer in video averaging mode with a minimum of 50 sweeps selected.

2. Select the lowest operating frequency of the equipment under test and activate the transmitter with modulation applied. The RF emission of the equipment shall be displayed on the spectrum analyzer.

3. Using the marker of the spectrum analyzer, find lowest frequency below the operating frequency at which spectral power density drops below the required value.

4. Select the highest operating frequency of the equipment under test and find the highest frequency at which the spectral power density drop below the required value.

5. The difference between the frequencies measured in step 3 and step 4 is the operating frequency range.

The equivalent isotropically radiated power is then calculated from the measured value, the known antenna gain, relative to an isotropic antenna, and if applicable, any losses due to cables and connectors in the measurement system.

4.3 Test Results/Plots

Permitted range of operating frequencies Please refer to Appendix C
Occupied Bandwidth Please refer to Appendix A

5. Unwanted emissions in the spurious domain

5.1 Limit of Spurious Emissions

The power of any spurious emission shall not exceed the following values given in the following table.

Frequency State	47 MHz to 74 MHz 87,5 MHz to 108 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other frequencies ≤ 1 000 MHz	Frequencies > 1 000 MHz
Operating	4 nW	250 nW	1 µW
Standby	2 nW	2 nW	20 nW

5.2 Test Procedure

The EUT was placed on a nonmetal table which is 1.5 meter above the grounded reference plane and set to work in normal operation mode. Details refer to EN 300 440 subclause 4.2.4.

The EUT was operating at transmitting mode to represent worst case during final qualification test.

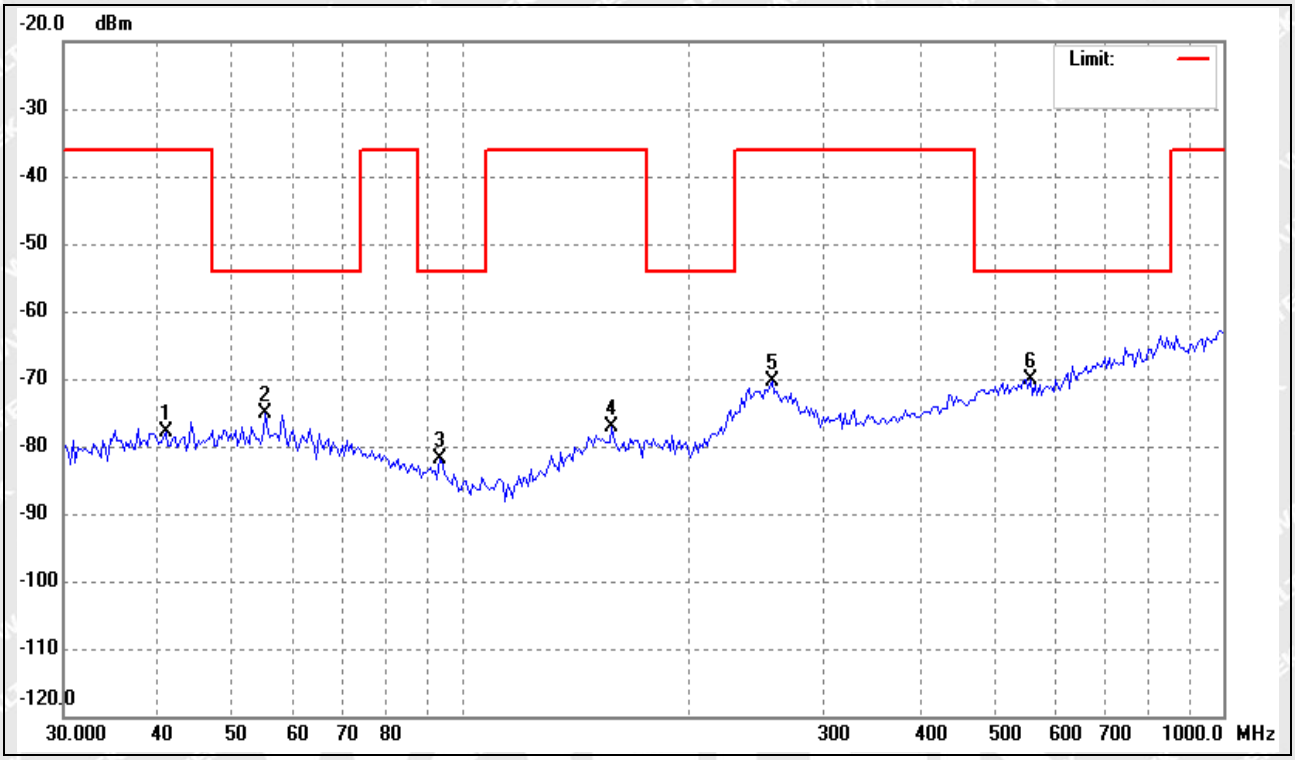
5.3 Summary of Test Results/Plots

According to the data sheet, the EUT complied with the EN 300 440 standards, and had the worst margin of:

Note: *this EUT was tested in 3 orthogonal positions and the worst case position data was reported.*

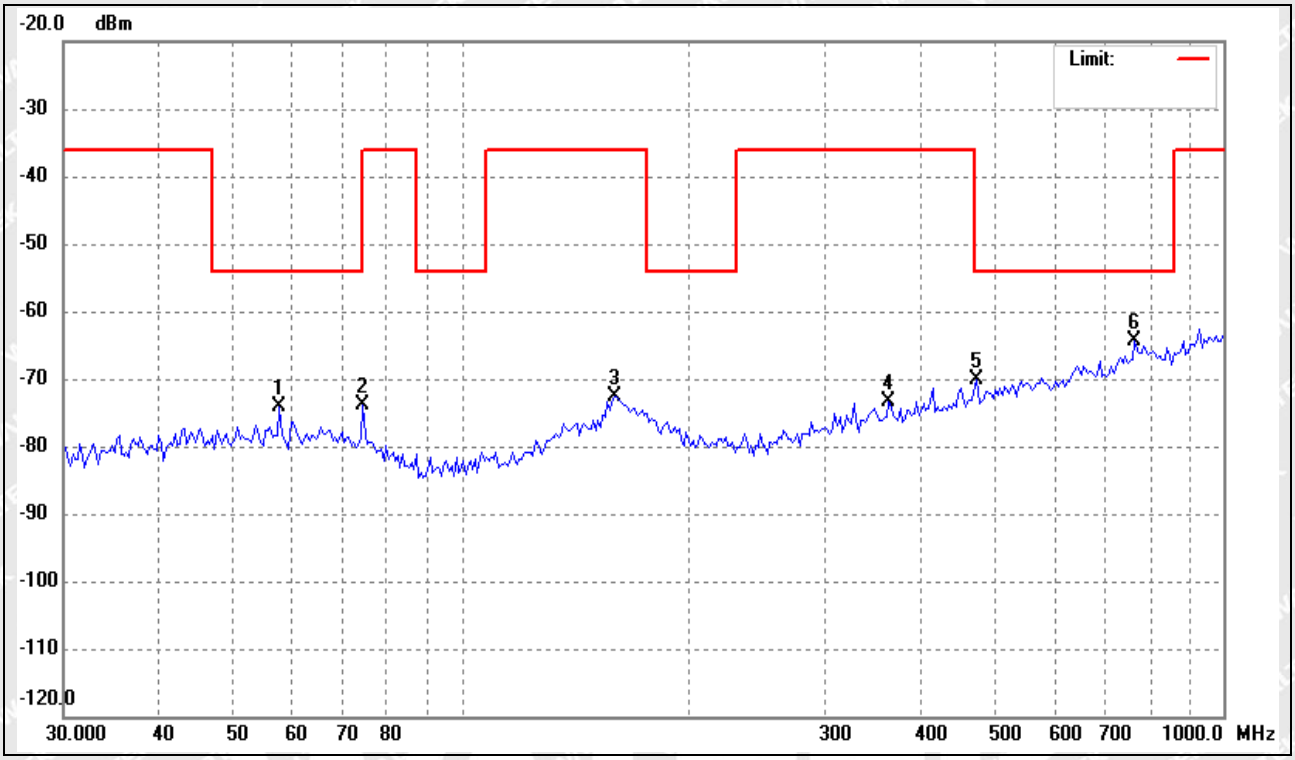
➢ Radiated Spurious Emission From 30MHz To 1GHz

802.11a(worst case)			
Test Channel:	Lowest channel(worst case)	Polarity:	Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	40.8699	-80.49	2.63	-77.86	-36.00	-41.86	ERP
2	55.2883	-78.08	2.86	-75.22	-54.00	-21.22	ERP
3	93.6532	-78.82	-3.16	-81.98	-54.00	-27.98	ERP
4	157.5290	-78.10	0.96	-77.14	-36.00	-41.14	ERP
5	255.8226	-78.34	8.07	-70.27	-36.00	-34.27	ERP
6	558.0788	-77.81	7.81	-70.00	-54.00	-16.00	ERP

Test Channel:	Lowest channel(worst case)	Polarity:	Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	57.6693	-77.54	3.34	-74.20	-54.00	-20.20	ERP
2	74.2696	-75.76	1.94	-73.82	-36.00	-37.82	ERP
3	158.6399	-79.90	7.39	-72.51	-36.00	-36.51	ERP
4	363.5231	-77.94	4.62	-73.32	-36.00	-37.32	ERP
5	474.7913	-76.96	6.72	-70.24	-54.00	-16.24	ERP
6	765.6482	-76.05	11.78	-64.27	-54.00	-10.27	ERP

➢ Radiated Receiver Spurious Emission Above 1GHz

Indicated		Table	Test Antenna		Corrected (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
Frequency (MHz）	Reading (dBm)	Angle	Height	Polar				
		Degree	Meter	H/V				
802.11a Lowest Channel-5745MHz								
11490.00	-57.37	51	1.5	H	19.77	-37.60	-30	-7.60
11490.00	-56.05	35	1.5	V	19.77	-32.13	-30	-2.13
17235.00	-57.57	122	1.5	H	23.92	-37.80	-30	-7.80
17235.00	-56.54	161	1.5	V	23.92	-32.62	-30	-2.62
802.11a-20 Highest Channel-5825MHz								
11650.00	-57.86	292	1.5	H	19.84	-38.02	-30	-8.02
11650.00	-58.07	62	1.5	V	23.99	-34.08	-30	-4.08
17475.00	-56.07	135	1.5	H	19.84	-36.23	-30	-6.23
17475.00	-56.06	101	1.5	V	23.99	-32.07	-30	-2.07

Note1: Testing is carried out with frequency rang 30MHz to 26.5GHz, which above 3^{h} Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
Note2: Pre-scan 802.11a,802.11n(HT20), 802.11n(HT40) mode, and found the 802.11a mode which it is worse case, so only show the test data for worse case.

Unwanted emissions in the spurious domain Please refer to Appendix D

6. Duty Cycle

6.1 Applicable Standard

Test is conducting under the description of ETSI EN 300 440 section 4.2.5. Where an acknowledgement is required, the additional transmitter on-time shall be included and declared by the manufacturer.

Frequency Band	Duty cycle	Application	Notes
2400MHz to 2483.5MHz	No Restriction	Generic use	
2400MHz to 2483.5MHz	No Restriction	Detection, movement and alert applications	
(a) 2446MHz to 2454MHz	No Restriction	RFID	Limits shown in annex D shall apply
(b) 2 446MHz to 2454MHz	≤15 %	RFID	Limits shown in annex D shall apply
5725MHz to 5875MHz	No Restriction	Generic use	
9200MHz to 9500MHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications	
9500MHz to 9975MHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications	
10.5GHz to 10.6GHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications	
13.4GHz to 14.0GHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications	
17.1GHz to 17.3GHz	DAA or equivalent techniques	Radiodetermination: GBSAR detecting and movement and alert applications	Limits shown in annex F shall apply
24.00GHz to 24.25GHz	No Restriction	Generic use and for Radiodetermination: radar, detection, movement and alert applications	

6.2 Test Procedure

Test is conducting under the description of ETSI EN 300 440 section 7.4.2.

6.4 Summary of Test Results/Plots

For generic use devices operating at frequency range 5725-5875MHz, according to ETSI EN 300 440, the duty cycle is no restriction.

7. Adjacent channel selectivity

7.1 Standard Application

According to section 4.3.3, the adjacent channel selectivity is a measure of the capability of the receiver to operate satisfactorily in the presence of an unwanted signal that differs in frequency from the wanted signal by an amount equal to the adjacent channel separation for which the equipment is intended.

The adjacent channel selectivity of the equipment under specified conditions shall not be less than the levels of the unwanted signal as stated in table 6.

Receiver category	Limit
1	-30dBm + k
2	No limit
3	No limit

The correction factor, k, is as follows:

$$k = -20\log f - 10\log BW$$

Where:
- f is the frequency in GHz;
- BW is the channel bandwidth in MHz.

The factor k is limited within the following:
- -40 < k < 0 dB.

7.2 Test Procedure

This measurement shall be conducted under normal conditions.
Two signal generators A and B shall be connected to the receiver via a combining network to the receiver, either:
a) via a test fixture or a test antenna to the receiver integrated, dedicated or test antenna; or
b) directly to the receiver permanent or temporary antenna connector.
The method of coupling to the receiver shall be stated in the test report.
Signal generator A shall be at the nominal frequency of the receiver, with normal modulation of the wanted signal. Signal generator B shall be unmodulated and shall be adjusted to the adjacent channel centre frequency immediately above that of the wanted signal.
Initially signal generator B shall be switched off and using signal generator A the level that still gives sufficient response shall be established. The output level of generator A shall then be increased by 3 dB.
Signal generator B is then switched on and adjusted until the wanted criteria are met. This level shall be recorded.
The measurements shall be repeated with signal generator B unmodulated and adjusted to the adjacent channel centre immediately below the wanted signal.
The adjacent channel selectivity shall be recorded for the upper and lower adjacent channels as the level in dBm of the unwanted signal.

For tagging systems (e.g. RF identification, anti-theft, access control, location and similar systems) signal generator A may be replaced by a physical tag positioned at 70 % of the measured system range in metres. In this case, the adjacent selectivity shall be recorded as the level in dBm of lowest level of the unwanted signal (generator B) resulting in a non-read of the tag.

7.3 Summary of Test Results/Plots

Mode	Frequency A (MHz)	Test Frequency B (MHz)	Test Result (dBm)	Limit (dBm)	Results
802.11a	5745	5725	-46.14	-57.34	Pass
		5765	-47.29	-57.34	Pass
	5825	5805	-47.15	-57.46	Pass
		5845	-47.12	-57.46	Pass
802.11n-HT20	5745	5725	-46.18	-57.64	Pass
		5765	-47.32	-57.64	Pass
	5825	5805	-46.98	-57.76	Pass
		5845	-46.53	-57.76	Pass
802.11n-HT40	5755	5715	-47.52	-60.77	Pass
		5795	-47.60	-60.77	Pass
	5795	5755	-47.83	-60.83	Pass
		5835	-46.74	-60.83	Pass
802.11ac-VHT80	5775	5695	-47.12	-63.97	Pass
		5855	-47.61	-63.97	Pass

8. Blocking or desensitization

8.1 Standard Application

According to section 4.3.4, blocking is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted input signal at any frequencies other than those of the spurious responses or the adjacent channels or bands, see clauses 4.3.3 and 4.3.4.

The blocking level, for any frequency within the specified ranges, shall not be less than the values given in table 7, except at frequencies on which spurious responses are found.

Receiver category	Limit
1	-30dBm + k
2	-45dBm + k
3	No limit

The correction factor, k, is as follows:

$$k = -20\log f - 10\log BW$$

Where:
- f is the frequency in GHz;
- BW is the occupied bandwidth in MHz.

The factor k is limited within the following:
- -40 < k < 0 dB.

8.2 Test Procedure

This measurement shall be conducted under normal conditions.
Two signal generators A and B shall be connected to the receiver via a combining network to the receiver, either:
a) via a test fixture or a test antenna to the receiver integrated, dedicated or test antenna; or
b) directly to the receiver permanent or temporary antenna connector.
The method of coupling to the receiver shall be stated in the test report.
Signal generator A shall be at the nominal frequency of the receiver, with normal modulation of the wanted signal. Signal generator B shall be unmodulated and shall be adjusted to a test frequency at approximately 10 times, 20 times and 50 times of the receive channel bandwidth above upper band edge of the receive channel. Initially signal generator B shall be switched off and using signal generator A the level which still gives sufficient response shall be established. The output level of generator A shall then be increased by 3 dB. Signal generator B is then switched on and adjusted until the wanted criteria are met. This level shall be recorded.
The measurement shall be repeated with the test frequency for signal generator B at approximately 10 times, 20 times and 50 times of the receive channel bandwidth below the lower band edge of the receive channel.
The blocking or desensitization shall be recorded as the level in dBm of lowest level of the unwanted signal

(generator B).
For tagging systems (e.g. RF identification, anti-theft, access control, location and similar systems) signal generator A may be replaced by a physical tag positioned at 70 % of the measured system range in metres. In this case, the blocking or desensitization shall be recorded as the ratio in dB of lowest level of the unwanted signal (generator B) resulting in a non-read of the tag. to the declared sensitivity of the receiver +3 dB.

8.4 Summary of Test Results/Plots

Model	Frequency A (MHz)	Test Frequency B (MHz)	Test Result (dBm)	Limit (dBm)	Measured
802.11a	5745	Centre Frequency + 50*BW	-44.61	-57.34	Pass
		Centre Frequency + 20*BW	-47.28	-57.34	Pass
		Centre Frequency + 10*BW	-50.42	-57.34	Pass
		Centre Frequency - 10*BW	-49.30	-57.34	Pass
		Centre Frequency – 20*BW	-46.69	-57.34	Pass
		Centre Frequency - 50*BW	-44.16	-57.34	Pass
	5825	Centre Frequency + 50*BW	-44.74	-57.46	Pass
		Centre Frequency + 20*BW	-48.03	-57.46	Pass
		Centre Frequency + 10*BW	-49.84	-57.46	Pass
		Centre Frequency - 10*BW	-49.86	-57.46	Pass
		Centre Frequency – 20*BW	-46.47	-57.46	Pass
		Centre Frequency - 50*BW	-43.31	-57.46	Pass
802.11n-HT20	5745	Centre Frequency + 50*BW	-43.80	-57.64	Pass
		Centre Frequency + 20*BW	-47.94	-57.64	Pass
		Centre Frequency + 10*BW	-49.91	-57.64	Pass
		Centre Frequency - 10*BW	-49.33	-57.64	Pass

		Centre Frequency – 20*BW	-46.55	-57.64	Pass
		Centre Frequency - 50*BW	-43.65	-57.64	Pass
	5825	Centre Frequency + 50*BW	-44.54	-57.76	Pass
		Centre Frequency + 20*BW	-47.80	-57.76	Pass
		Centre Frequency + 10*BW	-50.51	-57.76	Pass
		Centre Frequency - 10*BW	-49.59	-57.76	Pass
		Centre Frequency – 20*BW	-47.05	-57.76	Pass
		Centre Frequency - 50*BW	-44.07	-57.76	Pass
802.11n-HT40	5755	Centre Frequency + 50*BW	-44.17	-60.77	Pass
		Centre Frequency + 20*BW	-47.41	-60.77	Pass
		Centre Frequency + 10*BW	-50.42	-60.77	Pass
		Centre Frequency - 10*BW	-50.09	-60.77	Pass
		Centre Frequency – 20*BW	-47.26	-60.77	Pass
		Centre Frequency - 50*BW	-43.23	-60.77	Pass
	5795	Centre Frequency + 50*BW	-44.56	-60.83	Pass
		Centre Frequency + 20*BW	-47.41	-60.83	Pass
		Centre Frequency + 10*BW	-50.54	-60.83	Pass
		Centre Frequency - 10*BW	-49.85	-60.83	Pass
		Centre Frequency – 20*BW	-46.91	-60.83	Pass
		Centre Frequency - 50*BW	-44.10	-60.83	Pass
802.11ac-VT80	5755	Centre Frequency + 50*BW	-44.16	-63.97	Pass

		Centre Frequency + 20*BW	-47.23	-63.97	Pass
		Centre Frequency + 10*BW	-49.78	-63.97	Pass
		Centre Frequency - 10*BW	-49.29	-63.97	Pass
		Centre Frequency – 20*BW	-46.95	-63.97	Pass
		Centre Frequency - 50*BW	-43.25	-63.97	Pass
	5795	Centre Frequency + 50*BW	-44.49	-64.03	Pass
		Centre Frequency + 20*BW	-48.01	-64.03	Pass
		Centre Frequency + 10*BW	-50.39	-64.03	Pass
		Centre Frequency - 10*BW	-49.74	-64.03	Pass
		Centre Frequency – 20*BW	-47.37	-64.03	Pass
		Centre Frequency - 50*BW	-43.52	-64.03	Pass

9. Spurious radiation

9.1 Limit of Spurious Emissions

According to the ETSI EN 300 440 section 4.3.5, the power of any spurious emission shall not exceed 2 nW in the range 25MHz to 1GHz and shall not exceed 20 nW on frequencies above 1GHz.

9.2 Test Procedure

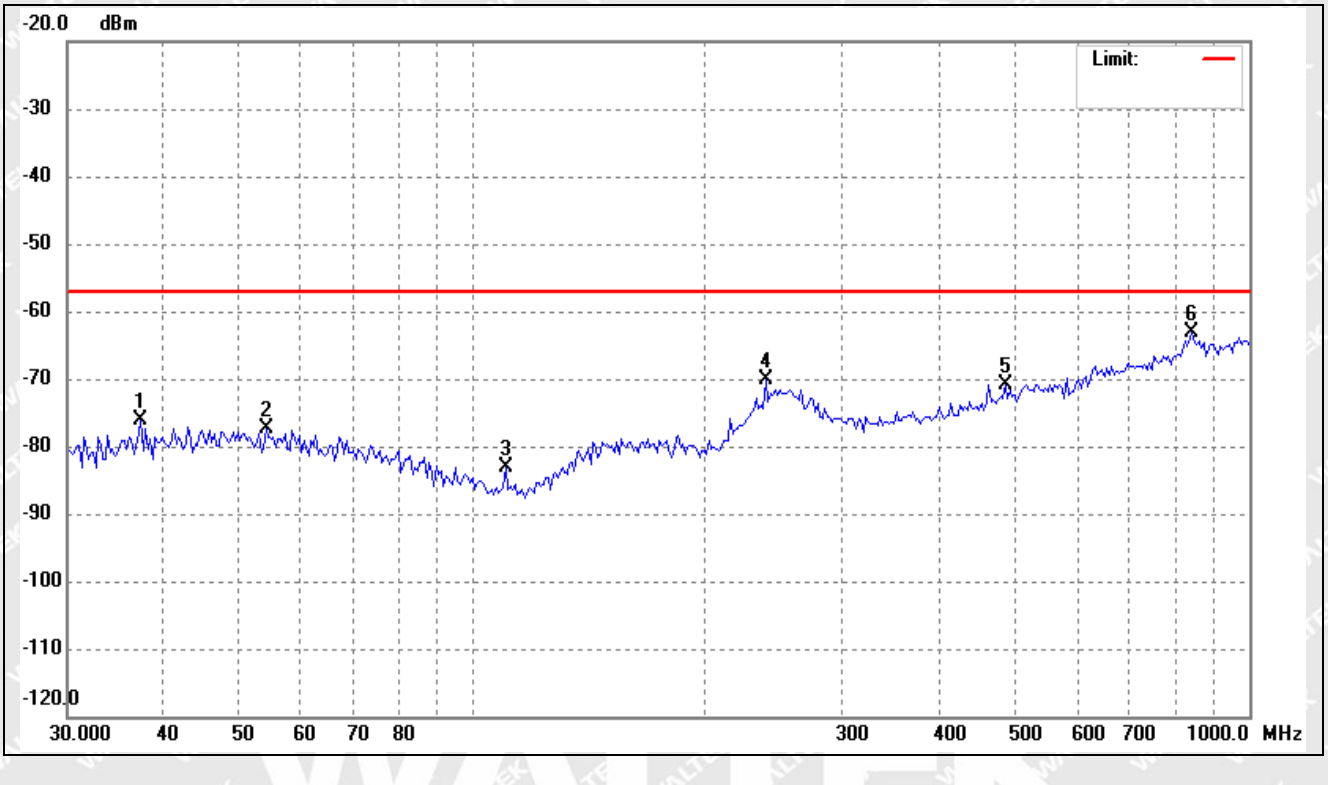
The EUT was placed on a nonmetal table which is 1.5 meter above the grounded reference plane and set to work in receiving operation mode. For more detail please refer to the ETSI EN 300 440 section 4.3.5.3
The EUT was operating at normal to represent worst case during final qualification test.

9.3 Summary of Test Results/Plots

According to the data sheet, the EUT complied with the EN 300 440 standards, and had the worst margin of:

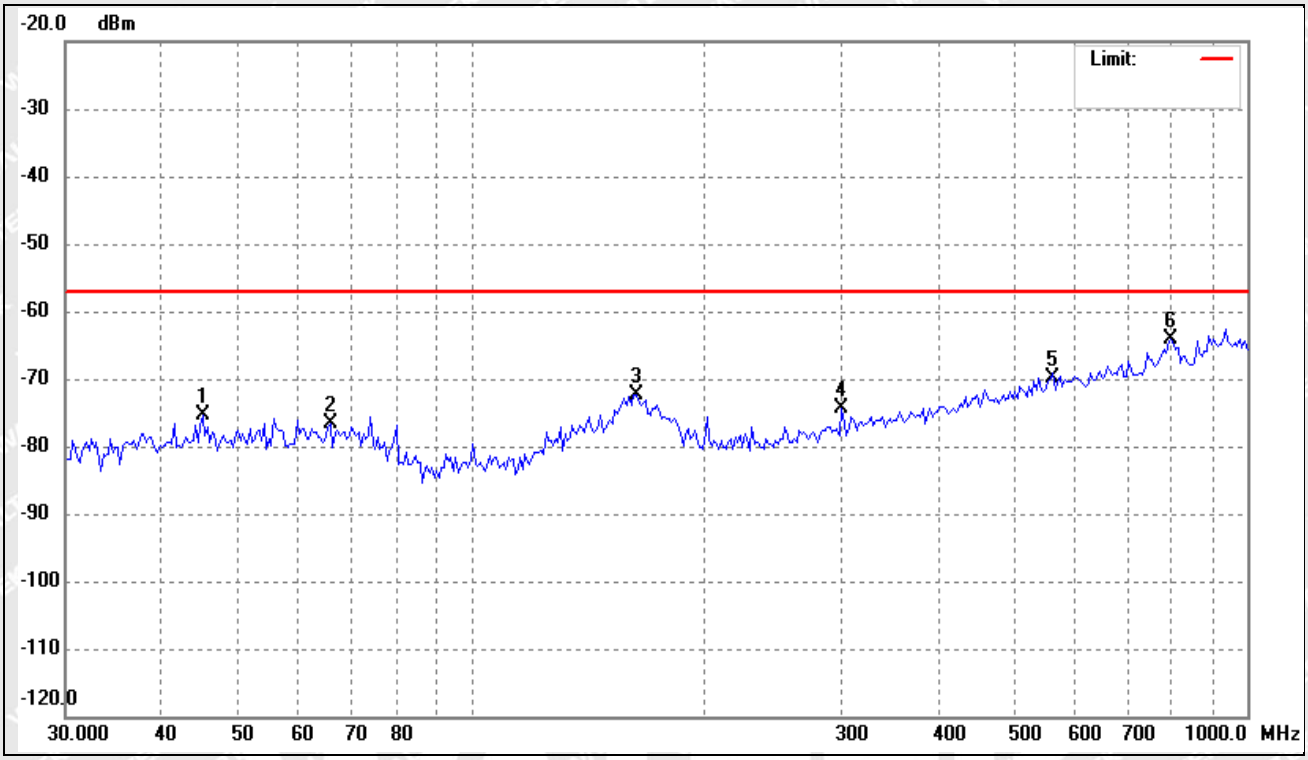
➢ Radiated Receiver Spurious Emission From 30MHz To 1GHz

Test Channel:	Lowest channel(worst case)	Polarity:	Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	37.3017	-78.35	2.29	-76.06	-57.00	-19.06	ERP
2	54.1349	-80.44	3.00	-77.44	-57.00	-20.44	ERP
3	110.0818	-78.50	-4.56	-83.06	-57.00	-26.06	ERP
4	238.4626	-76.72	6.57	-70.15	-57.00	-13.15	ERP
5	484.9068	-77.65	6.89	-70.76	-57.00	-13.76	ERP
6	844.8028	-76.64	13.63	-63.01	-57.00	-6.01	ERP

Test Channel:	Lowest channel(worst case)	Polarity:	Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	45.0951	-78.40	3.03	-75.37	-57.00	-18.37	ERP
2	65.9067	-79.79	3.17	-76.62	-57.00	-19.62	ERP
3	163.1623	-79.84	7.37	-72.47	-57.00	-15.47	ERP
4	300.6988	-77.75	3.32	-74.43	-57.00	-17.43	ERP
5	558.0788	-77.94	8.13	-69.81	-57.00	-12.81	ERP
6	798.6205	-76.74	12.62	-64.12	-57.00	-7.12	ERP

➢ Radiated Receiver Spurious Emission Above 1GHz

Frequency (MHz)	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
1759.76	-59.52	-47.00	-12.52	H
4832.34	-60.97	-47.00	-13.97	H
2764.51	-60.76	-47.00	-13.76	V
7586.83	-62.48	-47.00	-15.48	V

Note: Testing is carried out with frequency rang 30MHz to 26.5GHz, which above 1GHz are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
Note2: Pre-scan 802.11a,802.11n(HT20), 802.11n(HT40) mode, and found the 802.11a mode which it is worse case, so only show the test data for worse case.
Receiver spurious emissions Please refer to Appendix E

10. Spectrum access techniques

10.1 Standard Application

Minimum transmitter off-time

The minimum TX off-time allows other users with LBT facility to get access to a channel.

The minimum TX-off time is defined as the period where a specific transmitter shall remain off after a transmission or a communication dialogue between units or a polling sequence of other units.

The limit for the minimum TX-off time is > 25 ms.

The TX-off time shall be declared in the test report by the equipment manufacturer.

Maximum transmitter on-time

A transmitter shall only be allowed to transmit continuously for a maximum specified period. This will prevent a transmitter from occupying a channel for an extended period.

The maximum on-time shall always be as short as possible for the application since SRD applications are often battery operated.

The maximum transmitter on-time is defined as the maximum time the transmitter can be on during:

a) A single transmission.

b) Multiple transmissions and acknowledgements for a communication dialogue or polling sequence of other units under the condition that the channel is free.

An equipment intended for very long messages shall be capable of switching to a "free" channel before the maximum transmitter on-time is reached for each channel of operation.

The limit for a single transmission TX on-time is 2 s.

For further information on measurements of maximum transmitter on-time, see clause 4.4.2.2.

The time for the transmission dialogue or a polling sequence shall be less than 10 s.

In the case of the above timing, t, reaches the limit then the minimum TX-off time limit shall apply automatically.

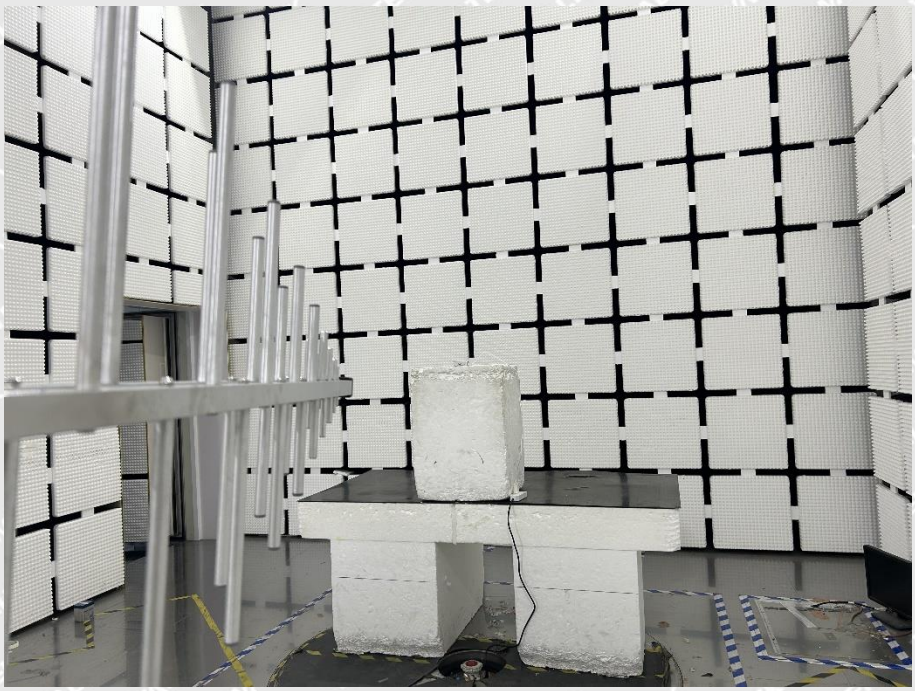
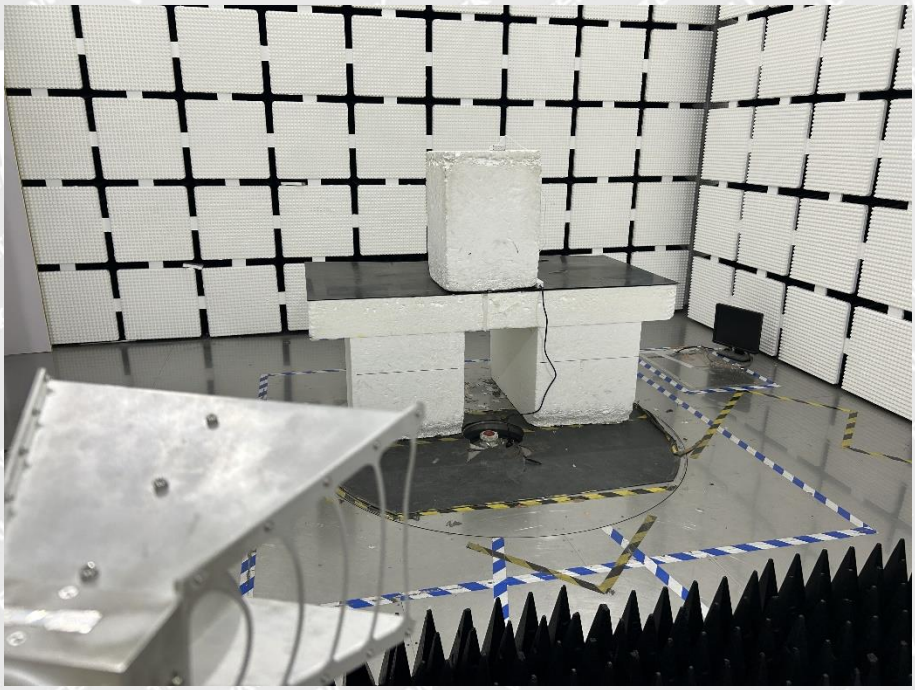
10.2 Summary of Test Results/Plots

Model	Test Frequency (MHz)	Min. TX-off time (ms)	Min. TX-off time Limit (ms)	Max. TX-on time (s)	Max. TX-on time Limit (s)	Measured
802.11a	5745	33.28	> 25	1.10	< 2	Pass
802.11n-HT20	5745	34.15	> 25	1.16	< 2	Pass
802.11ac-VHT20	5745	32.27	> 25	1.18	< 2	Pass
802.11n-HT40	5755	34.59	> 25	1.34	< 2	Pass
802.11ac-VHT40	5755	33.19	> 25	1.25	< 2	Pass
802.11ac-VHT80	5755	32.47	> 25	1.06	< 2	Pass

EXHIBIT 1 - EUT PHOTOGRAPHS

Please refer to “ANNEX”.

EXHIBIT 2 - TEST SETUP PHOTOGRAPHS

Spurious Emission Test Setup (Below 1GHz)	
Spurious Emission Test Setup (Above 1GHz)	

******* END OF REPORT *******